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**Towards the selection of phosphorus efficient rice varieties**

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Where intensive rice cultivation with continuous application of phosphorus (P) fertilizers is practiced in the irrigated lowlands of Asia, soil P concentration is in a favorable level for rice cultivation. However, intensive P fertilization for rice would not be a viable option as the quantity and quality of the P fertilizers are decreasing gradually. Moreover, low-input rice based cropping systems exist in the rainfed lowlands often show P deficiency. Under such circumstances it is very important to identify rice varieties which can produce a higher biomass and yield at limited P availability. Moreover, identification of shoot and root characteristics enhancing P uptake and internal use are also of prime importance when introducing and improving rice varieties to be used in P limited soils. Therefore, an experiment was established in a low-P site (Colwell P of 1.7 mg P $kg^{-1}$ air dry soil) at the rice research and Development Institute, Bathalagoda, Sri Lanka. Thirty six inbred rice lines obtained from the International Rice Research Institute (IRRI) showing the promise in relation to efficient P uptake and/or utilization characteristics, and forty four local inbred rice varieties recommended to be cultivated in Sri Lanka were used. Six weeks after transplanting three seedlings were harvested from each variety and replicate with the roots. Shoot and root growth were measured. When considering the shoot growth the best performing IRRI lines were IRRI-123, Kalubala Vee, Tsipala-421 and IR-8 while the best local varieties were Bg406, Bw363, Bg369, Bg400-1 and Bw452. Moreover, the best performing local varieties were producing 2.3 time higher biomass than that of best producing IRRI lines. The root mass ratio of the best performing IRRI varieties ranged from 16-38% while that of local varieties were 15-22%. The characteristics required for the greater growth response of above local and IRRI rice varieties need to be investigated further in order to understand the efficient P uptake and utilization mechanisms in rice.

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**Challenges and opportunities on the use of bio fertilizers: examples from Senegal and Kenya**

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Not only phosphorus (P) bio available in soil is very low but phosphate fertilizing efficiency is also low. Consequently, annual world P demand increases predicting phosphorus stock end in the coming 125 years. In addition to that, the high cost of chemical fertilizers obliges most Sub Sahara African smallholder farmers to do not use fertilizers which ultimately results in poor yields. In this paper, we present opportunities and challenges of using bio fertilizers as sustainable way of alleviating soil P deficiency effects in Kenya and Senegal. In Kenya where soil P deficiency has been identified as the biggest challenge of crop productivity increases, we share results on the use of commercialized arbuscular mycorrhizal inoculants to replenish soil P. While in Senegal known having huge quantities of P rock deposit and important quantities of feed stock material that can be charred (biochar), we present results on the capacities of biochar to improve P availability for plant cultivated in sandy soil. Results from both countries show that current expectations on the use of bio fertilizers are numerous and justified. However challenges on sustainable agriculture through the use of the called bio fertilizers especially mycorrhizal inoculants and biochar are still ahead.